1886MNRAS..47...63M

Mr. Sherman's Observations of Bright Lines in Stellar Spectra.

By E. W. Maunder.

I fear, from Mr. Sherman's reply to my former Paper, that I was not sufficiently explicit in my criticism of his observations, for he certainly seems to have missed the point of my remarks. Nor has he yet explained his method of procedure in such a way that I can understand it.

His object is "to render the image of the bright line light as broad and intense as may be, and the intensity of the background light a minimum." I see but one way of attaining this end: viz., by employing as high a dispersion as the star will bear, and by making the spectrum as pure as possible by the use of a long collimator and narrow slit. Mr. Sherman has indeed employed a fairly high dispersion, but so far as I can judge has made no effort to secure purity of spectrum.

We may take it that the image of a star in the primary focus of a telescope is practically a point. The spectrum of a star is therefore a straight line, and as the image of the star has no very appreciable breadth it is not necessary, in order to see the spectrum, to use a slit. The star will, as Mr. Sherman truly argues, act as a slit for itself. If, then, certain radiations be missing in the star's light we shall have the coloured line of the star spectrum broken by dark points, each dark point being a negative image of the star. If certain radiations in the star's light be exceedingly brilliant we shall have them appearing as bright points on the coloured line of the star spectrum, each bright point being an image of the star; and indeed the entire continuous spectrum is but a succession of an infinite number of various coloured images of the star. By what means then does Mr. Sherman secure that his bright lines are of a *greater* breadth than the star spectrum when he uses no cylindrical lens, and of a *less* breadth than the star spectrum when he broadens it out into a band by the use of a cylindrical lens?* How is it that they escape the broadening effect of the cylindrical lens whilst the spectrum on which they stand is widened out? It was this point in particular which made me say (*Monthly Notices*, vol. xlvi. p. 283): "It seems very difficult to believe that this can be a description of the behaviour of true stellar bright lines," and not the changeable flickering appearance which Mr. Sherman ascribes to them, though I confess that, in my view, added to the unlikelihood of their being true lines. My remarks as to the positions of the slit and cylindrical lens were also directed to this point, as I thought it possible that with a slit badly adjusted and the cylindrical lens close to the eye, false images, produced within the spectroscope, might present the very appearance Mr. Sherman has described of long lines in the red, and stellar points in the green. Per-

---

* "At the red end, under a sharp focus, they (the bright lines) stand out the full breadth of the spectrum, bearing somewhat the same relation to the background as the prominence to the solar spectrum. *In the brighter portion of the spectrum they are cut down to fine star-points.*"

1886MNRAS..47...63M

sonally I much prefer the use of the cylindrical lens before the slit, but it is not *necessarily* wrong to use it close to the eye.

Mr. Sherman, whilst expanding my criticism as to the width of his slit, fails to see how it affects his measures. His slit was 6′ of arc in width, the diffraction disc of his star was, he adds, about 3″. The slit was therefore 120 times too wide at least, not merely 100 times, as I said. The purpose of a slit in stellar spectroscopy is twofold. It is not necessary in order to see the spectrum, but it is necessary to give it purity, and so to bring up fine lines. And it is absolutely essential for measures of position. Unless the slit is so nearly closed as just to hold the star between its jaws, what guarantee has the observer that the star is not travelling about from one side to the other of the slit? And if the star moves, the lines in its spectrum will move too. With a slit of the width recorded by Mr. Sherman no reliance whatsoever can be placed on the positions he records for the lines he observed, unless he can show that he had some means of absolutely fixing the star to one particular and invariable position. Then again, how did he obtain his fiducial points for the reduction of his observations? Did he allow the light from vacuum tube or taper to shine in through this wide slit, thus practically observing the comparison spectrum through a slit 120 times that of the stellar spectrum? Surely I was right in saying that such a slit was practically no slit at all. Mr. Sherman, for all that appears, might as well have removed his slit plates altogether.

I infer from the second paragraph on p. 18 in Mr. Sherman's reply that he wishes to withdraw his claim for some, if not for many, of the stars he has examined. I felt sure that more careful and continued observations would lead him to that conclusion.

Finally, I have no wish to say that in every case Mr. Sherman has been misled. I frankly confess that I do not think his observations look promising; but since we were both in pretty close accord as to our observations of *Nova Andromedæ*, he will, I hope, acquit me of any desire to pass a sweeping condemnation on his entire work.

With regard to the numerous quotations he has made from various observers, I trust that he will not do me the injustice of supposing that they were either unknown to or ignored by me. I do not, however, see how they bear upon the point at issue, which is, not whether bright lines have not been detected in a few special stellar spectra, but whether they form a prominent but hitherto unsuspected feature in every one of fifty stellar spectra taken at random; and whether true bright lines could behave as Mr. Sherman has described his lines as doing, viz. show themselves either as broader or narrower than the general stellar spectrum of which they formed a part.

Royal Observatory, Greenwich:
1886, *December* 10.

1886MNRAS..47...63M

Observations of Comet f 1886 (*Barnard*), *made at the Royal Observatory, Greenwich.*

(*Communicated by the Astronomer Royal.*)

The observations were made with the East or Sheepshanks Equatorial, aperture 6·7 inches, by taking transits over two cross-wires at right angles to each other, and each inclined 45° to the parallel of Declination.

Comet f 1886.

1886.		Greenwich Mean Solar Time.	Observer.	☄−✱ R.A.	Corr. for Par. and Refract. in R.A.	☄−✱ N.P.D.	Corr. for Par. and Refract. in N.P.D.	No. of Comp.	Apparent R.A.	Apparent N.P.D.	Comp. Star.
		h m s		m s	s	′ ″	″		h m s	° ′ ″	
Nov.	17	18 0 31	T.	+0 40·00	−0·24	+ 8 24·5	−6·1	2	13 11 48·72	77 6 50·5	*a*
	17	18 1 30		−0 29·70	−0·25	− 2 22·5	−6·5	1	13 11 50·29	77 6 23·3	*b*
	18	17 5 26	H. T.	−3 32·85	−0·29	− 1 5·6	−6·3	6	13 18 35·82	76 41 14·9	*c*
	30	17 25 57		+1 25·00	−0·40	+ 7 21·4	−6·6	3	15 7 23·80	72 17 52·0	*d*
	30	17 48 7		+5 7·43	−0·40	− 2 28·8	−7·5	3	15 7 33·93	72 17 26·6	*e*
Dec.	2	17 55 49		−0 52·66	−0·40	+ 4 11·0	−7·1	8	15 29 30·29	72 1 55·4	*f*
	7	5 29 34	T.	+0 38·15	+0·40	− 4 39·5	−7·8	4	6 19 45·65	72 17 2·1	*g*
	7	5 34 45		−0 33·81	+0·50	− 8 36·8	−8·4	10	16 19 47·89	72 17 11·4	*h*
	9	17 5 3	H. T.	+0 21·73	−0·30	+11 36·5	−4·7	3	16 47 9·83	72 57 5·5	*i*